Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB.

Conducted and published for the Club, by

BENJAMIN LINCOLN ROBINSON, Editor-in-chief.

FRANK SHIPLEY COLLINS
MERRITT LYNDON FERNALD
HOLLIS WEBSTER } Associate Editors.

WILLIAM PENN RICH
EDWARD LOTHROP RAND } Publication Committee.

Vol. 17. June, 1915. No. 198.

CONTENTS

Michaux's Panicum muricatum. *M. L. Fernald* . . 105

Notes on New England Hepaticae,—XII. *A. W. Evans* . . 107

Two Philadelphus Combinations. *A. H. Moore* . . . 121

American Variations of Lycopodium annotinum. *M. L. Fernald* 123

Antennaria canadensis in Pennsylvania. *H. W. Pretz* . . 125

Josselyn Botanical Society Meeting (Announcement). . . 128

Boston, Mass.
1052 Exchange Building.

Providence, R. I.
Preston and Rounds Co.

RHODORA.— A monthly journal of botany, devoted primarily to the flora of New England. Price, *$1.50* per year (domestic and foreign); single copies 15 cents. Prices of Volumes 1 and 2 (1899 and 1900) on application. All remittances by check or draft, except on Boston or New York, must include ten cents additional for cost of collection. Notes and short scientific papers, relating directly or indirectly to the plants of the northeastern states, will be gladly received and published to the extent that the limited space of the journal permits. Forms will be closed five weeks in advance of publication. Authors (of more than one page of print) will receive 25 copies of the issue in which their contributions appear. Extracted reprints, if ordered in advance, will be furnished at cost.

Address manuscripts and proofs to
B. L. ROBINSON, 3 Clement Circle, Cambridge, Mass.

Subscriptions, advertisements, and business communications to
W. P. RICH, 300 Massachusetts Avenue, Boston, Mass.

Single copies may be had from
E. L. RAND, Corresponding Sec'y N. E. Botanical Club,
1052 Exchange Building, Boston, Mass.

Entered at Boston, Mass., Post office as Second Class Mail Matter

KEY TO NEW ENGLAND TREES, Wild and Commonly Cultivated, based primarily upon leaf characters, by J. FRANKLIN COLLINS and HOWARD W. PRESTON. Price 40c. net. PRESTON & ROUNDS Co., Providence, R. I.

CARD-INDEX OF NEW GENERA, SPECIES AND VARIETIES OF AMERICAN PLANTS, 1885 TO DATE.

For American taxonomists and all students of American plants the most important supplement to the Index Kewensis, this catalogue in several ways exceeds the latter work in detail, since it lists not merely the flowering plants, but pteridophytes and cellular cryptogams, and includes not merely genera and species, but likewise subspecies, varieties and forms. A work of reference invaluable for larger herbaria, leading libraries, academies of sciences, and other centers of botanical activity. Issued quarterly, at $15.00 per 1000 cards.

GRAY HERBARIUM of Harvard University,
Cambridge, Mass., U. S. A.

CHECK LIST OF GRAY'S MANUAL, 7th EDITION, compiled by M. A. DAY. Leatherette. Pocket size. Invaluable for collector's memoranda and herbarium records. Published and sold by the GRAY HERBARIUM, Cambridge, Mass. Price postpaid 20 cts. each. Ten copies $1.50.

SECOND-HAND BOOKS. Botanical and Entomological. For sale at bargain. List on application with two cent stamp. ELIZABETH F. CURTISS, 4853 Kimbark Avenue, Chicago.

Advertisements of Nurserymen and Dealers in Botanical and other Scientific Publications are inserted in these pages at the following rates per space of 4 in. by 3–4 in. 1 year $4.00,, 6 months $2.50.

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 17. June, 1915. No. 198.

MICHAUX'S PANICUM MURICATUM.

M. L. Fernald.

For some years it has been well known to New England botanists that, besides the common introduced *Echinochloa Crusgalli* (L.) Beauv. and the essentially maritime *E. Walteri* (Pursh) Nash, we have a third species indigenous in sloughs, ditches, dune-hollows, pond-margins, etc., with the glabrous sheaths and comparatively short awns of the Old World *E. Crusgalli* but with the trichomes of the second glume and the sterile lemma quite unlike those of the introduced species. In European *E. Crusgalli* the margins and often the nerves of the second glume and the sterile lemma bear appressed-ascending fine trichomes which are not thickened at base or only slightly and inconspicuously so. In the indigenous American plant, however, these trichomes in the mature spikelets are stiffer and coarser, strongly divergent, and have a conspicuous papillose or pustular base, giving to the spikelets and consequently to the inflorescence a very muricate appearance. This indigenous plant of eastern America, found in the coastal region from southern Maine to Georgia and Mississippi and inland at low altitudes to the Great Lake region, South Dakota and Kansas, well matches Michaux's description of his *Panicum muricatum* from "Canada ad ripas lacus *Champlain* et ad lacum *Ontario*"; "glumis.... muricato-hispidissimis. *Obs.* affine C. *Galli:* flores habitu Cenchri";[1] and is clearly indicated by the present writer's notes, made in 1903, after examination of the Michaux type. The indigenous American plant is also further indicated by Poiret's full description of Michaux's Lake Champlain

[1] Michx. Fl. Bor.-Am. i. 47 (1803).

material as *P. pungens* (*P. muricatum* Michx., not Lam. [i. e. Retz.]), when he said: "Cette plante a l'aspect d'un *cenchrus* par ses fleurs; elle se rapproche, par ses autres caractères, du *panicum crus galli.*" [1] But in view of Hitchcock's identification of the Michaux type from Lake Champlain with the European *E. Crusgalli*,[2] it has seemed desirable to have the specimen again examined. M. Gagnepain has, therefore, most kindly compared for me specimens sent as nos. 1 and 2: no. 1, the indigenous plant which seemed to be Michaux's species; no. 2, the introduced *E. Crusgalli.* Of the former specimen he writes, under date of June 26, 1914.

"1. De tous points comparable au *Panicum muricatum* de l'herb. Michaux:

Mêmes pointes sur les glumelles, fortes, raides avec un renflement dur à la base. Ce sont ces aspérités qui ont sans doute fait donner à l'espèce son nom.

* * * * * * * * * * * *

J'ai écrit autrefois sous la dictée de M. Hitchcock, je crois, pour le *P. muricatum* Michx., P. CRUS GALLI L."

As stated, the European *E. Crusgalli*, of which the writer has examined many specimens, has much finer less spreading trichomes on the spikelets and is well matched by the commonly introduced plant of barnyards, cultivated fields, and similar artificial habitats. In North America rare plants seem to indicate a slight transition between the introduced and the indigenous plants but these specimens are so infrequent as to seem like probable hybrids of the two species. In view of the constancy of the European plant in the Old World, where it does not come in contact with the American plant with strongly muricate spikelets, this seems the reasonable explanation, and the indigenous American plant may be called

ECHINOCHLOA **muricata** (Michx.) n. comb. *Panicum muricatum* Michx. Fl. Bor.-Am. i. 47 (1803). *P. pungens* Poir. Encycl. Suppl. iv. 273 (1816). *P. Crusgalli*, var. *muricatum* Farwell, Mich. Acad. Sci. Rep. vi. 210 (1904).— The following are characteristic specimens. QUEBEC: shores of Lake Champlain, *Michaux* (type in herb. Michaux). MAINE: Harding's, Brunswick, September, 1899, *K. Furbish;* wet clayey basin, North Berwick, August 27, 1894, *J. C. Parlin.* VERMONT: Manchester, August 22, 1903, *Blanchard*, no. 22. MASSACHUSETTS: sandy head of a cove, Bay View, Gloucester, September 11,

[1] Poir. Encyc. Suppl. iv. 273 (1816).
[2] Hitchc. Contrib. U. S. Nat. Herb. xii. 146. (1908).

1913, *Fernald, Hunnewell & Long*, no. 8672; exsiccated pond-holes, Lakeville, August 26, 1913, *Fernald & Long*, no. 8668; Brewster, September 11, 1912, *F. S. Collins*, no. 1555; sandy river-shore, Stockbridge, August 24, 1902, *Hoffmann*. RHODE ISLAND: peaty margin of small pond north of Crescent Beach, Block Island, August 20, 1913, *Fernald & Long*, no. 2667. CONNECTICUT: Hart's Upper Reservoir, Berlin, September 27, 1900, *J. N. Bishop;* field, Bridgeport, August 19, 1893, *E. H. Eames*. NEW YORK: Castle swamp, Oneida, August 12, 1906, *House*, no. 2776. NEW JERSEY: Atlantic City, August, 1895, *Scribner*. WEST VIRGINIA: Sweet Springs, September 5, 1903, *Steele*, no. 201; Dry Fork River, near Harmon, September 12, 1904, *Greenman*, no. 52. NORTH CAROLINA: cultivated ground, Biltmore, July 23, 1897, *Biltmore Herb.* no. 809*a*. GEORGIA: wet meadows, Lafayette, August 2, 1900, *Harper*, no. 343. MISSISSIPPI: near Starkville, September 27, 1896, *Kearney*, no. 7. ONTARIO: Galt, September 1, 1908, *Heriot*. MICHIGAN: Alma, August 28, 1895, *C. A. Davis;* Owasso, August 24, 1890, *G. H. Hicks* (material compared by M. Gagnepain and pronounced identical with the Michaux plant). WISCONSIN: wet grounds, "Native!" Milwaukee, *Lapham*. ILLINOIS: gravelly beach, Sangamon R., White Heath, October 5, 1912, *A. S. Pease*, no. 14,090; swamp along lake shore, Waukegan, August 17, 1906, *Gleason & Shobe*, no. 320. MINNESOTA: Ft. Snelling, August 22, 1891, *E. A. Mearns*, no. 39. MISSOURI: fields, Whiteside, September 11, 1911, *J. Davis*, no. 1017. KANSAS: open ground, Riley Co., 1896, *J. B. Norton*, no. 884b. SOUTH DAKOTA: Huron, *D. Griffiths*, no. 773.

GRAY HERBARIUM.

NOTES ON NEW ENGLAND HEPATICAE,— XII.

ALEXANDER W. EVANS.

IN the present series of Notes the following additions to the hepatic flora of New England are reported and discussed: *Fossombronia cristula, Lophocolea alata, Cephalozia macrostachya,* and *Cephaloziella spinicaulis*. Two other species, *Cephalozia catenulata* and *Calypogeia paludosa,* are included for nomenclatorial reasons, and the paper is concluded by a list of additions to local state floras and a census of New England Hepaticae according to our present information.

1. FOSSOMBRONIA CRISTULA Aust. Proc. Acad. Philadelphia for

1869: 228. On moist sandy or clayey soil. Massachusetts: Amesbury (*J. W. Huntington*, October, 1901); Middleton, Essex County (*H. H. Bartlett*, November, 1908); Reading (*C. C. Kingman*, November, 1908). Connecticut: Milford (*A. W. E.*, October, 1909). New to New England. The following stations outside of New England may likewise be recorded: Axton, New York (*E. B. Chamberlain*, September, 1910); near Batsto, New Jersey, the type locality (*C. F. Austin*, October, 1868, distributed in Hep. Bor.-Amer. *121*); Highlands, New Jersey (*C. C. Haynes*, October, 1905, and November, 1912, the latter specimens distributed in Amer. Hepat. *118*, as *F. foveolata*); Morgantown, West Virginia (*J. L. Sheldon*, October, 1909); between Dune Park and Mineral Springs, Indiana (*G. S. Bryan*, 1914).

The elaters of this curious species, as originally emphasized by Austin, yield its most distinctive characters. They are exceedingly inconspicuous; when the contents of a capsule are examined under a low magnification it often appears as if no elaters were present, and a magnification of at least three hundred diameters is essential for their proper study. They are remarkable not only on account of their small size and delicate structure but also on account of their variability in form and scanty development. Their most unusual features, however, are found in the local thickenings of their walls. Instead of forming two or more parallel spirals, these usually consist of from five to nine rings, some of which may be connected to form a single rudimentary spiral. In rarer cases a longitudinal band of thickening is present to which one or more rings are attached. According to a series of measurements made on a part of the type material the elaters vary from 28 μ to 58 μ in length and from 6 μ to 18 μ in width. But the length and width do not vary proportionally, one elater having a width of 18 μ being only 36 μ in length. The bands of thickening are less deeply pigmented than in most species of *Fossombronia* and are sometimes very pale indeed and difficult to demonstrate. According to Stephani [1] the elaters are acuminate, but all those studied by the writer were blunt. The variability in form is indicated to a certain extent by the measurements given: it should be added that most of the elaters are straight or nearly so and that some of them show irregular branching.

The brown spores in the type material are mostly between 36 μ

[1] Mém. de l'Herb. Boissier **16** : 31. 1900.

and 40 μ in diameter, while those in the material from Middleton, Massachusetts, are mostly between 40 μ and 46 μ. The spherical face is covered over with a more or less regular reticulum formed by intersecting lamellae about 2 μ in height. These lamellae appear pale brownish when seen from the surface, dark brown when seen in profile. No border is developed at the periphery of the spherical face, but the neighboring ridges of the reticulum sometimes give the effect of a narrow interrupted border. The meshes of the reticulum are mostly 8–10 μ wide and the spherical face usually measures six or seven meshes across. Sometimes the reticulum is irregular or incomplete. The three plane faces are not clearly defined, the bounding edges being rounded and destitute of distinct longitudinal thickenings. This portion of the spore-surface is roughened by low and irregular warts and low ridges which never unite to form a reticulum.

A new South American *Fossombronia* with elaters similar to those of *F. cristula* was described by Goebel [1] three years ago under the name *F. Luetzelburgiana*. It was based on material collected in 1911 by Ph. von Luetzelburg in the Serra dos Orgaos, near Rio de Janeiro, Brazil. According to its author the elaters measure 40–65 μ in length and are characterized by annular thickenings with very rare indications of spiral thickenings. The spores measure 50 μ in length and are covered over with a lamellate reticulum. It will be seen at once that this species is very close indeed to *F. cristula*. In fact the only essential difference brought out is the dioicous inflorescence, that of *F. cristula* being monoicous (paroicous). Goebel regards the elaters of *F. Luetzelburgiana* as reduced structures and compares them with the sterile cells in the capsules of *Sphaerocarpos*, *Riella*, and *Corsinia*, in which no thickenings whatever are produced.

Among northern species the closest ally of *F. cristula* is *F. foveolata* Lindb. The spores, in fact, are exactly alike in the two species, so far as their surface-sculpture is concerned. According to authors there is a slight difference in the size of the spores. Underwood [2] states that those of *F. cristula* are 35–44 μ in diameter while those of *F. foveolata* are 42–50 μ. Stephani gives measurements of 37 μ and 40 μ, respectively. These differences are not constant and, even if they were, they would be too slight to deserve much emphasis. With the difference in the spore measurements eliminated there is nothing

[1] Flora **105** : 55. *f. 1A, 1B, 2–4.* 1912.
[2] Bot. Gaz. **21** : 70. 1896.

to separate *F. cristula* from *F. foveolata* except the peculiar elaters. In *F. foveolata* these are of the type normal to the genus. They are more or less curved and contorted and usually measure 60–100 μ in length and about 10 μ in greatest diameter. The spirals are distinct and deeply pigmented with yellowish brown. There are usually two spirals running from end to end, but one or both of these may branch, so that the elater may show three or four spirals through a part of its length. The thin part of the wall sometimes disappears at maturity. The elaters taper somewhat, the ends themselves being either sharp-pointed or blunt.

Although the difference in the elaters is so striking, the lack of other differential characters separating *F. cristula* from *F. foveolata* is somewhat disconcerting. Might it not be possible that the reduced elaters of *F. cristula* were the result of unfavorable conditions during the development of the sporophyte? At the present time there is no evidence to support such an idea. The capsules of *F. cristula* present no appearance of incomplete or abnormal development, and reduced elaters of the *F. cristula* type have not been reported from Europe, where *F. foveolata* is as common as in North America. The only observations which have any bearing on the question are those of Macvicar [1] in his discussion of *F. echinata* Macv. and *F. caespitiformis* De Not., two species of Europe and northern Africa. He finds that the elaters here sometimes become shorter and thicker than is usual, and he associates this condition with incomplete development. These thick elaters, however, still show distinct spirals so that they do not simulate very closely the annular elaters of *F. cristula.* Until evidence is brought forward showing that *F. cristula* is an undeveloped abnormal form of *F. foveolata,* it seems justifiable to regard it as a valid species or, at any rate, as a "kleine Art."

Austin proposed *F. cristula* nearly fifty years ago, and its distinctness has been recognized by Lindberg,[2] Underwood, and Stephani. In spite of these facts no stations have been cited for the species except the original locality. A short time ago Dr. G. H. Conklin sent a slide of the Indiana material for examination with the suggestion that it might represent *F. cristula.* A comparison with the material in Austin's Hep. Bor.-Amer. showed that this suggestion was correct and led to a re-examination of the material preserved as *F. foveolata* in

[1] Rev. Bryol. **38** : 74. 1911.
[2] Acta Soc. Sci. Fenn. **10** : 533. 1875.

the writer's herbarium and in the collection of Miss Haynes. In this way the additional stations cited above were brought to light. They show that *F. cristula* has an extensive range in the eastern United States and indicate that it is a species of southern rather than of northern distribution.

2. Lophocolea alata Mitt.; Larter, Devon. Assoc. Adv. Sci. Litt. & Art 1906: 285; Macvicar, Jour. Bot. **45**: 260. 1907; Student's Handb. British Hepat. 235. *f. 1–6.* 1912. *L. cuspidata,* var. *alata* K. Müll.; Rabenhorst's Kryptogamen-Flora **6**: 803. 1911. On sandstone along the edge of a brook, Simsbury, Connecticut (*Miss Lorenz,* December, 1914). Although this is the first station to be recorded for North America, the species was discovered at Milford, Pennsylvania, in 1908, by G. E. Nichols and reported by the writer as *L. cuspidata* (Nees) Limpr.[1] It is known in Europe from Great Britain and France. The validity of *L. alata* as a species is not above question and there is even some probability that there are intergrading forms connecting it with *L. cuspidata.* At the same time it presents characters which usually make its recognition easy, and its known range in Europe is decidedly more restricted than that of *L. cuspidata,* from which it is presumably derived. In North America *L. cuspidata* is known only from the Pacific Coast eastward to the Rocky Mountains, so that this evidence also, incomplete as it is, would strengthen the claims of *L. alata* for acceptance.

The differences between *L. cuspidata* and *L. alata* are clearly described by both Macvicar and Schiffner.[2] In *L. cuspidata* the color is pale or yellowish green, the leaves are imbricated and bifid about one fourth, the lobes are subulate and acuminate, the median leaf-cells average about 30 μ in length, the perichaetial bracts are bifid about one third, with a narrow acute sinus and subulate, acuminate lobes, the bracteole is bifid in a similar way to about the middle or even beyond, and the perianth is sometimes destitute of wings, although narrow wings are occasionally present. In *L. alata* the color is a darker green, the leaves are less closely imbricated and less deeply bifid (usually about one fifth) with shorter lobes, the median leaf-cells average about 40 μ in length, the perichaetial bracts are less deeply bifid (about one fifth to one fourth) with a lunulate sinus and broader,

[1] Bryologist **13** : 34. 1910.
[2] Lotos **58** : [19]. 1910.

less acuminate lobes, the bracteole is bifid in much the same way as the leaves, and the perianth bears one or more usually broad wings along its angles. Additional differential characters taken from the sporophyte may be quoted from Schiffner. According to his account the spores in *L. cuspidata* average about 16 μ in diameter, and the elaters have two spirals throughout their entire length; in *L. alata*, on the other hand, the spores usually measure 19–21 μ in diameter, and the elaters at one or both ends have very often a single spiral for a considerable distance. Unfortunately the Simsbury specimens lack capsules, so that these observations could not be confirmed. In their gametophytic characters, however, they agree closely with the following English specimens: near Castleton, Derbyshire (*H. W. Pearson*, distributed in Hep. Europ. Exsic. *275*); Cuckfield, Sussex (*W. E. Nicholson*, communicated by Miss Lorenz).

Both *L. alata* and *L. cuspidata* are autoicous in their inflorescence and on this account frequently bear perianths. In *L. bidentata* (L.) Dumort., which agrees with them in many points, the inflorescence is dioicous and perianths are rarely developed. In the form of the leaves *L. bidentata* usually resembles *L. alata* more closely than it does *L. cuspidata*, but the leaf-cells are smaller than in either of the autoicous species and measure 25–30 μ in the middle of the leaf. The distribution of *L. bidentata* in New England is very incompletely known. Although it has been reported from every state except New Hampshire, the writer has seen specimens from Massachusetts and Connecticut only. It seems to be most at home on moist or wet sandstone.

3. CEPHALOZIA CATENULATA (Hüben.) Spruce, On Cephalozia 33. 1882. *Jungermannia catenulata* Hüben. Hep. Germ. 169. 1834. *J. reclusa* Tayl. Jour. Bot. **5**: 278. 1846 (in part). *Cephalozia reclusa* Dumort. Hep. Eur. 92. 1874. *C. serriflora* Lindb. Medd. Soc. F. et Fl. Fenn. **3**: 188. 1878. *C. virginiana* Spruce, On Cephalozia 37. 1882.

Hübener's *Jungermannia catenulata* has been the source of considerable confusion to students of the Hepaticae. It was based on specimens collected in western Germany, the habitat being described as "Torfboden in Sümpfen." According to the original description the lobes of the perichaetial bracts were entire. Spruce considered the species synonymous with Taylor's *J. reclusa* (in a restricted sense) and with Lindberg's *Cephalozia serriflora*, a species with dentate or

spinose bracts, usually growing on rotten logs. According to Spruce the bracts were variable in his *C. catenulata*, the lobes being sometimes entire and sometimes variously toothed. Certain later European writers considered Spruce's species an aggregate. In their opinion the plant with entire lobes represented the true *J. catenulata*, while the one with toothed lobes represented *J. reclusa* or *C. serriflora*. In accordance with these ideas the writer recommended eleven years ago that Lindberg's name be retained for the plant with toothed bracts. It was recommended further that Taylor's name be given up altogether. This suggestion was made because Taylor's species, although older, was based on several distinct plants. Just what the plant with entire lobes represented was not considered because no species answering to the descriptions was known from North America.

A year ago Schiffner [2] was able to clear up the confusion about *J. catenulata* by the study of specimens in the Nees von Esenbeck herbarium at Strassburg. He found that the bracts in this material, which was received from Hübener himself, were distinctly toothed and that the original description was therefore in error when it stated that they were entire. For this reason it becomes necessary to revive the name *C. catenulata* and to apply it to the species which has recently been known in North America as *C. serriflora*. Schiffner showed further that the plant with entire lobes deserved no special recognition, being apparently a mixture of *C. catenulata* and *C. macrostachya* Kaalaas.

It will be noted that *C. virginiana* is included among the synonyms of *C. catenulata*, in spite of the fact that it is accepted as valid by Stephani.[3] Spruce based this species on material collected at Portsmouth, Virginia, and preserved in the Schimper herbarium. He proposed it as new with reservations, emphasizing its close relationship to *C. catenulata*. According to his account the inflorescence in *C. virginiana* is either autoicous or dioicous, the latter condition being the more usual, the androecia are elongated, the perianth is wider above the middle, and its mouth is setulose or ciliolate. In *C. catenulata*, on the other hand, the inflorescence is invariably dioicous, the androecia are short, the perianth is not wider above the middle, and the mouth is setose or ciliate, in other words it has longer teeth. It

[1] Rhodora **6** : 173. 1904.
[2] Hedwigia **54** : 313. *text fig. 1–5.* 1914.
[3] Bull. de l'Herb. Boissier II. **8** : 375. 1908.

will be seen at once that the differences indicated are based on very variable characters. Through the kindness of Dr. Howe a portion of the type specimen in the Underwood herbarium has been available for study. Since this specimen shows no peculiarities sufficient to warrant a specific separation from *C. catenulata,* and since several European writers have demonstrated an occasional autoicous inflorescence in the latter plant, it seems justifiable to consider the two species synonymous. *C. catenulata* has been recorded from all six of the New England states.

4. Cephalozia macrostachya Kaalaas, Rev. Bryol. **29**: 8. 1902. *C. multiflora,* var. *β elata* Spruce, On Cephalozia 38. 1902. In bogs. Rhode Island: Westerly (*A. W. E.,* April, 1911). Connecticut: North Branford (*W. R. Dudley,* August, 1882); Woodbury (*A. W. E.,* June, 1902); Bingham Pond, Salisbury (*A. W. E.,* June 1905); Berlin (*G. E. Nichols,* November, 1910); Andover (*A. W. E.,* July, 1911); New Haven (*A. W. E.,* April, 1915). Kaalaas based the present species on material collected by E. Ryan at Glemminge, Norway. Nine years after its original publication it was reported by Nicholson [1] from various localities in Sussex, England, and the following year it was recognized as valid by both Macvicar [2] and K. Muller.[3] The latter writer cited stations for the species from Denmark, as well as from Norway and England, and predicted its discovery in other regions. Later in the same year Schiffner [4] reported it from various localities in Bavaria, from the vicinity of Hamburg, and from Sweden, and last year [5] published the first record for North America, based on specimens collected at Freeport, Long Island, in October, 1898, by M. A. Howe. The stations given above extend its known range into southern New England, and it will probably prove to be as widely distributed on this side of the Atlantic as in Europe. The New England material has been compared with the various specimens distributed in Schiffner's Hepaticae Europaeae Exsiccatae and also with a portion of the Long Island material, kindly communicated by Dr. Howe.

In its dioicous inflorescence *C. macrostachya* agrees with *C. media*

[1] Hastings and East Sussex Nat. **1** : 274 *pl. 22, f. 10.* 1911.
[2] Student's Handb. British Hepatics 263. 1912.
[3] Rabenhorst's Kryptogamen-Flora 6^2 : 56. *f. 17.* 1912.
[4] Oesterr. Bot. Zeitschr. **62** 159. 1912.
[5] Hedwigia **54** : 321. 1914.

Lindb. and *C. catenulata* (Hüben.) Spruce, and in certain respects it is intermediate between these two species. According to Kaalaas the elongated antheridial spikes or androecia yield its most distinctive characters. In his description of these spikes he states that the bracts are numerous (sometimes as many as fourteen pairs); that they are two or three times as large as the leaves; that they are imbricated, transversely attached, and bifid (or rarely trifid) to the middle or beyond with acute sinuses; and that the lobes of the bracts are narrowly lanceolate and acute with more or less spinose-dentate margins. He adds that the lower bracteoles are smaller than the bracts but that the upper ones are fully as large and bifid in much the same way. Macvicar and Müller accept the characterization of Kaalaas and lay an equal emphasis on the androecia in distinguishing *C. macrostachya* from its allies.

Schiffner, however, brings out the interesting fact that androecia of the type described by Kaalaas are not of constant occurrence. He finds that the antheridial spikes are sometimes short, that the lobes of the bracts are sometimes entire or nearly so (except for a small tooth on the dorsal margin), and that the bracteoles are sometimes small throughout the length of the inflorescence. He finds further that spikes of this simpler type sometimes occur in connection with spikes of the more complex type and sometimes replace the latter altogether. As he points out the androecia of *C. media* agree in all essential respects with the simpler androecia just described, and it should be added that the androecia of *C. catenulata* agree almost as closely.

On account of the inconstancy of the characters drawn from the antheridial inflorescences Schiffner, in distinguishing *C. macrostachya* from *C. media*, lays emphasis on the shape of the leaves, the peculiarities of the perichaetial bracts, and the teeth at the mouth of the perianth. The features which he considers most important were, for the most part, brought out in the original description, although Kaalaas regarded them as less important than those drawn from the androecia. They may be briefly described as follows: the leaves are bifid to about the middle with an obtuse-lunulate sinus and straight or connivent, acute divisions, each usually tipped with a row of two cells; the perichaetial bracts are bifid to beyond the middle with long acuminate lobes, each usually bearing on the outer edge two slender and often hair-like teeth; the mouth of the perianth has small teeth,

some of which are usually elongated into slender cilia. The contrasting characters in *C. media* are the following: the leaves are usually less deeply bifid, and the lobes, which are nearly always connivent, are more shortly pointed, being usually tipped with a single cell instead of a row of two cells; the perichaetial bracts are less deeply bifid, the lobes are less acuminate, and each usually bears on the outer edge a single broader and often blunt tooth; the mouth of the perianth is minutely crenulate or setulose from cells projecting singly.

To these differences may be added a slight difference in the size of the leaf-cells. Schiffner criticises the measurements in Müller's description of *C. macrostachya*, where the cells are said to be 30–35 μ in diameter. He notes that the original description gives a length of 23–35 μ and a width of 19–23 μ, and he adds that he himself has found the cells to be about 20 μ in diameter. He suggests that Müller may have made his measurements toward the dorsal base of the leaf, where the cells are invariably larger. From a series of measurements made by the writer on various specimens the cells in the upper part of the leaves were found to average about 21 $\times$ 18 μ, while those in the basal region averaged about 30 μ in diameter. In *C. media* the corresponding averages were 30 $\times$ 24 μ and 35 μ.

In separating *C. macrostachya* from *C. catenulata*, the leaves and the perichaetial bracts are again of much importance. In this latter species the leaves are bifid to the middle or less with a narrow sinus and usually parallel acute lobes; the leaf-cells, which are about as large as in *C. macrostachya*, have somewhat thicker walls, and the perichaetial bracts are less deeply bifid with broader and less acuminate lobes, the margins of which are coarsely and irregularly dentate or spinose-dentate. *C. catenulata* rarely occurs in bogs, its usual habitat being rotten logs, while *C. macrostachya*, according to the information at hand, is confined to bogs.

It will be seen from the foregoing notes that the recognition of sterile material of *C. macrostachya* or of male material with androecia of the simpler type is beset with difficulties, and it is probably unwise to attempt a positive determination in all cases. For this reason the writer has left unnamed several specimens which he suspects belong to *C. macrostachya*. None of the American specimens so far examined has shown androecia of the complex type described by Kaalaas. All the androecia studied, however, except a few very short ones, have shown small but distinct bracteoles, structures which are usually absent altogether from the androecia of *C. media*.

The gemmiparous form of *C. macrostachya* is distinguished as var. *propagulifera* by Schiffner. He based this variety on a set of specimens collected by H. Paul at Bernau in Bavaria and distributed in Hep. Europ. Exsic. *547*. Schiffner states that the gemmiparous stems are terminated by a rather broad bud, which encloses a dense cluster of *Opuntia*-like chains of gemmae. He adds that the gemmae themselves are unicellular and clavate, measuring about 18×8 μ, that the leaves of the cluster are pointed and toothed in much the same way as the perichaetial bracts, and that underleaves similar to the bracts are likewise present. In No. 547 of the Yale herbarium most of the gemmiparous branches are very small (about 0.25 mm. in diameter), the leaves and underleaves are less sharply pointed and less toothed than Schiffner implies, and some of the largest gemmae measure 24×12 μ. These slight differences, however, might well come within the range of variation to be expected. In the material from Bingham Pond, Salisbury, which is likewise gemmiparous, some of the branches with gemmae proliferate and revert to an ordinary vegetative condition. When this takes place the gemmiparous leaves and underleaves become scattered along the elongated axis and show striking irregularities in shape, some of them being deeply divided into hair-like divisions. Here again the largest gemmae are about 24×12 μ, although many of them are of course considerably smaller. Both here and in the original Bavarian specimens the gemmae have slightly thickened walls and are occasionally vaguely angled.

5. Cephaloziella spinicaulis Douin, Rev. Bryol. **40** : 81. 1913. On rocks. Mt. Carmel, Hamden, Connecticut (*A. W. E.*, April, 1908). Cathedral Rock, West Hartford, Connecticut (*Miss Lorenz*, March, 1914). No other localities can be cited at the present time. According to the very brief description of Douin this species differs from all other members of the genus in having the stems covered with numerous projecting cells forming blunt teeth. Nothing more is told about the plant except that it is known in sterile condition only and that the material upon which it was based was collected by the present writer. In looking through the specimens of *Cephaloziella* which were submitted to Douin for determination it was found that the material from Mt. Carmel, cited above, was named *C. Hampeana* (Nees) Schiffn., a part being referred to the forma *typica* and a part to the new variety *spinicaulis* Douin. The latter plant, therefore, which fully agrees with Douin's description, probably represents the type of *C. spinicaulis*.

The projecting cells, which Douin emphasizes so strongly, are very striking. In extreme cases numerous cells of a superficial row project and form a narrow ridge, from the margin of which rounded or bluntly conical crenulations or denticulations arise, each consisting of one or two cells. All gradations occur between this extreme condition and that in which the projecting cells are isolated and irregularly scattered. No case has been observed, however, in which a stem was smooth for any considerable distance. It may be added that the walls of the cells are thin throughout. Both leaves and underleaves are well developed. The leaves, which are transversely attached or nearly so, spread at an angle of sixty degrees or less and are more or less concave. They are bifid nearly or quite to the middle with acute lobes and sinus. Their cells average about 10×8 μ and are thin-walled throughout. The margins of the leaves are sparingly crenulate or denticulate from projecting cells and the outer surface is roughened in much the same way as the stem; in other words it shows projecting cells, which are sometimes numerous, forming short and irregular ridges, and sometimes few and scattered. The underleaves are ovate and either pointed or shortly bifid at the apex. The margin and outer surface are much as in the leaves, although they tend to show fewer projecting cells.

Aside from its rough stems *C. spinicaulis* is much like *C. papillosa* Douin, a species recently reported by the writer [1] from Massachusetts and Connecticut. Although Douin implies that *C. spinicaulis* is the only species of the genus in which the stems are characterized by projecting cells, Howe,[2] in the description of his *Cephalozia divaricata scabra*, which is now considered a synonym of *C. papillosa*, states that the stems exhibit "rarely here and there minute paraphyllia-like appendages usually composed of two or three cells in a lineal series." If such structures were at all abundant they might throw doubt on the importance of the projecting cells in *C. spinicaulis* as a specific character. They must, however, be exceedingly rare because the writer has found no traces of them in most of the specimens of *C. papillosa* which he has examined. Under the circumstances, therefore, it seems justifiable to follow Douin in emphasizing the projecting cells and in considering *C. spinicaulis* a valid species. Unfortunately both the specimens studied are destitute of antheridia, archegonia, and gemmae.

[1] Rhodora **14** : 222. 1912.
[2] Mem. Torrey Club **7** : 129. 1899.

6. Calypogeia paludosa Warnst. Kryptogamenflora der Mark Brandenburg **2** : 1117. 1906. *C. Trichomanis,* var. *tenuis* Aust. Hep. Bor.-Amer. *74.* 1873. *Kantia Trichomanis,* var. *tenuis* Underw.; A. Gray, Manual, Ed. 6, 713. 1890. *Calypogeia tenuis* Evans, Rhodora **9** : 69. 1907. According to the Vienna Rules the present species should bear the name *C. paludosa,* although Austin recognized the plant much earlier than Warnstorf and gave it the varietal name *tenuis.* When the writer raised Austin's variety to specific rank he was unaware of Warnstorf's *C. paludosa,* published the preceding year in the supplement to his Kryptogamenflora. K. Müller considers *C. paludosa* a simple synonym of *C. sphagnicola* (Arn. & Perss.) Warnst. & Loeske, but Schiffner [1] has recently shown that this view cannot be maintained and that *C. paludosa* is more closely allied to *C. Trichomanis* (L.) Corda than to *C. sphagnicola.* In separating it from the latter species he finds differences in both gametophyte and sporophyte. In the gametophyte he emphasizes the fact that the leaf-cells of *C. paludosa* are thin-walled throughout while those of *C. sphagnicola* are thicker and show distinct trigones. He adds that the plants in *C. paludosa* are larger than in *C. sphagnicola,* that the leaves and leaf-cells are larger, and that the underleaves are less deeply bifid and have broader lobes.

In the sporophyte he brings out the following differences: in *C. paludosa* the cells of the outer layer of the capsule wall are in eight longitudinal rows on each valve and show no traces of local thickenings in their walls, the cells of the inner layer are in sixteen longitudinal rows and show annular bands of thickening, while the spores measure 12–14 μ in diameter; in *C. sphagnicola* the cells of the outer layer are in fourteen to sixteen longitudinal rows and usually show rod-like or band-like thickenings of the radial walls (some of which extend over a portion of the outer tangential wall), the cells of the inner layer are in twenty-four longitudinal rows and show annular thickenings (much as in *C. paludosa*), while the spores measure only 9–10 μ in diameter. In Schiffner's opinion it is the structure of the capsule which shows most clearly the close relationship of *C. paludosa* to *C. Trichomanis,* although he admits that the gametophytes of the two species sometimes resemble each other very closely. He reserves the name *C. Trichomanis* for plants with a paroicous inflorescence, *C. paludosa*

[1] Krit. Bemerk. über europ. Leberm. 13 : 8, 9. 1914.

being characterized by an autoicous inflorescence. In one specimen of *C. paludosa*, which he distinguishes as forma *subaquatica* (Hep. eur. exsic. *621b*) he found a single inflorescence with both antheridia and archegonia. This shows that *C. paludosa* is at least sometimes paroicous, but Schiffner still maintains it as a species because he has never found purely antheridial spikes in *C. Trichomanis*. His observations show that the claims of *C. paludosa* for recognition as a species rest on a rather insecure basis. It exhibits characters, however, which are usually easily recognized and there is little danger of confusing it with *C. Trichomanis* under ordinary circumstances. The plant is now definitely known from all six of the New England States.

The additions to local state floras, not already mentioned on the preceding pages, are as follows: —

For New Hampshire. *Pallavicinia Flotowiana*, Waterville (*Miss Lorenz*). *Lophozia Hatcheri;* Mt. Washington (*Miss Lorenz*).

For Vermont. *Chiloscyphus pallescens;* West Haven and Willoughby (*Miss Lorenz*). *Diplophyllum apiculatum;* Guilford (*Miss Lorenz*).

For Massachusetts. *Riccia arvensis;* New Marlboro (*Miss Lorenz*). *Ricciella crystallina;* Cheshire (*Miss Lorenz*). *Cephalozia fluitans* and *Mylia anomala;* Holden (*Miss Greenwood*).[1] *Anthoceros crispulus;* New Marlboro (*Miss Lorenz*).

For Connecticut. *Lophozia longidens;* foot of Pistapaug Mountain, Durham (*Miss Lorenz*).

The census of New England Hepaticae now stands as follows: Total number of species recorded, 184; number recorded from Maine, 128; from New Hampshire, 135; from Vermont, 119; from Massachusetts, 103; from Rhode Island, 78; from Connecticut, 140; common to all six states, 57.

Sheffield Scientific School, Yale University.

[1] Miss Greenwood has already reported these two species from Massachusetts. See Bryologist **18** : 8. 1915.

TWO PHILADELPHUS COMBINATIONS.

Albert Hanford Moore.

The well-known and loved fragrant shrub of every old-fashioned garden, the Common Syringa or Mock Orange, is a native of the Caucasus and Armenia and possibly of Europe, where it is at least thoroughly naturalized in some localities. It is very variable and easily passes by imperceptible gradations into a number of wild and horticultural varieties, most of which are cultivated in New England. One of the best known of these has commonly been called *P. satsumi* Sieb.,[1] but the original account of the supposed species thus named is a hopeless mixture of references to Japanese and American plants of quite different groups. The group including the American element is confined to the Western Hemisphere, in fact, the particular subgroup intended to the Southern States. It is thus a name which is a "permanent source of confusion and error."

P. satsumanus Sieb., according to Miq.,[2] and *P. coronarius* L. var. *satsumi* (Sieb.) Maxim.[3] are both based on *P. satsumi*. It is true that Rehder [4] attempts to rescue the name *P. satsumanus* by arguing that it is the first one whose description clearly applies to our plant, but the first synonym cited under it is *P. satsumi* Sieb., hence the author's purpose was evidently to replace the latter name by the name *P. satsumanus*. This intention to regard both names as equivalent is made yet clearer, not only by the obvious derivation of one from the other, but by the citation of Siebold as the authority for both. More than that, the new form of the name is plainly supposed to be an improvement on a native word by Latinization.

Whatever *P. satsumi* is, then, *P. satsumanus* is also, and, if, as is here true, *P. satsumi* is undeterminable, it logically follows that *P. satsumanus* ought to be discarded with it. Beyond the manifest intention of Miquel, we have neither right nor motive to go. The horticultural name *P. Yokohama* or *Yokohamae* is no better understood, for it also has been applied variously to our plant and to an ill-

[1] Fl. Gard. ii, 102 (1851–2).
[2] Ann. Mus. Bot. Lugd. Bat. iii, 99 (1867).
[3] Mém. Acad. Impér. Sci. St. Pétersb. ser. 7, no. 16, 40 (Feb. 9, 1867).
[4] Mitt. Deutsch. Dendrol. Gesellsch. 249–250 (1910).

defined phase of *P. Gordonianus*,[1] an American plant — surely a strange confusion.

Fortunately, there is an available name for our plant, which is a Chinese and Japanese variety having more acuminate leaves than the type, with conspicuous indurated teeth or serrations, evenly and rather distantly disposed, the long-acuminate tip often bent to one side, especially in wild specimens. Lange[2] describes a *P. acuminatus*. Koehne[3] cannot distinguish it from the plant currently known as *P. satsumi*. Schneider[4] also says that it is perhaps identical with *P. satsumi*, as usually interpreted. Authentic material together with Lange's figure seem to leave no doubt about this identity.

Our plant can hereafter be correctly known, therefore, as: Philadelphus coronarius L. var. **acuminatus** (Lge.) A. H. Moore, n. comb.

P. acuminatus Lge. Fortegn. Veterin. Landb. Forsthav. Charlottenl. Frilandst. 65 (1871); Bot. Tidsskr. ser. 3, ii, 131, pl. 2 (1877–9).

P. satsumi and *satsumanus* of authors.

P. coronarius L. var. *tomentosus* (Wall.) Hook. f. & Thoms.[5] is another variety of the old polymorphous species, this time, a Himalayan and Tibetan one. A specimen has been examined with the note, "Well established on rocky knoll near site of old greenhouse, Arlington, Mass.," which, while exhibiting some peculiarities, does not seem possible to refer elsewhere. The variety just mentioned is very hairy on the lower leaf-surfaces.

There are likewise several closely related species approaching the type or one of the varieties, which make the group a puzzling one.

In our Southern States one of the finest of the sweet-scented species is native, namely, *P. pubescens* Lois.[6] This species usually has longer racemes and handsomer foliage than *P. coronarius*, though the fragrance is not quite so strong or lasting. There is only one 'Mock Orange.'

[1] Presumably *P. Gordonianus* Lindl. Bot. Reg. xxiv, Misc. Notes, no. 21 (1838); xxv, pl. 32 (1839) = *P. Lewisii* Pursh, Fl. Am. Sept. i, 329 (1814).

[2] Fortegn. Veterin. Landb. Forsthav. Charlottenl. Frilandst. 65 (1871); Bot. Tidsskr. ser. 3, ii, 131, pl. 2 (1877–9).

[3] Deutsch. Dendrol. i, 180 (1893).

[4] Ill. Handb. Laubholzk. i, 371 (Feb. 2, 1905).

[5] Jour. Proc. Linn. Soc. (Bot.) ii, 83 (1858), *P. tomentosus* Wall. ex G. Don, Gen. Hist. Dichlam. Pl. ii, 807 (1832).

[6] Herb. Gén. Amat. iv, 268 (1820); *P. grandiflorus* P. W. Wats. Dendrol. Brit. i, pl. 46, 1825, not Willd.; *P. latifolius* Schrad. ex DC. Prod. Syst. Nat. Regn. Veg. iii, 206 (1828).

The leaves, the calyx, externally as well as internally, and the capsules are markedly pubescent.

Beadle [1] describes from Tennessee as a species, *P. intectus*, but it is only a variety which has the leaves, capsules, and outer surface of the sepals glabrous or relatively so.[2]

P. PUBESCENS Lois. var. **intectus** (Beadle) A. H. Moore, n. comb.

P. intectus Beadle, Bilt. Bot. Studies, i, 160 (1902).

The differences are thus comparable to those between *P. coronarius* and its variety, *tomentosus*, above.

WASHINGTON, D. C.

THE AMERICAN VARIATIONS OF LYCOPODIUM ANNOTINUM.

M. L. FERNALD.

THE disposition of the American plants ordinarily passing as *Lycopodium annotinum* L. has often been a source of some perplexity to students in our Northern States and British America. As commonly interpreted the species consists with us of the so-called typical *L. annotinum*, with leaves spreading, and var. *pungens* Desv., with shorter more rigid erectish leaves. The chief difficulties which field-botanists in the North have encountered have arisen from the fact that in the region from Newfoundland to the Great Lakes and eastern Pennsylvania there are two quite pronounced variations of *L. annotinum* with spreading or even reflexed leaves. A study of the material in the Gray Herbarium and the Herbarium of the New England Botanical Club, 184 numbers, shows that the species in North America falls into four, instead of two, rather pronounced tendencies, the typical form of the species crossing the continent, the three varieties each with more restricted distribution. The following synopsis may be of interest to others as a basis for the recognition of these four variations.

[1] Bilt. Bot. Studies, i, 160 (1912).

[2] Indeed, Beadle, l. c., says of it: "From *P. latifolius* Schrad. this species may be recognized by the glabrous or glabrate leaves and by the absence of pubescence on the hypanthium and exterior surface of the sepals."

Leaves mostly spreading or reflexed, those of the fruiting branches 5.5–11 mm. long.
Leaves lanceolate, linear-oblong or oblanceolate, thinnish, distinctly serrate ..... *L. annotinum.*
Leaves linear- or lance-attenuate, firm and thickish, entire or obsoletely serrate ..... var. *acrifolium.*
Leaves strongly ascending or appressed, those of the fruiting branches 2.5–6 mm. long.
Leaves linear- or lance-attenuate, thick, dorsally convex, entire. var. *pungens.*
Leaves lanceolate or lance-oblong, flat, obscurely serrate..var. *alpestre.*

L. ANNOTINUM L. Sp. Pl. 1566 (1753).— Eurasia and North America. Woods and clearings, Newfoundland to Alaska, south to Connecticut, New York, Michigan, Wisconsin, Colorado, Idaho and Washington.

Var. **acrifolium**, n. var., foliis lineari- vel lanceolato-attenuatis firmis crassis integris vel obsolete serratis patentibus vel reflexis.— Newfoundland to Pennsylvania, Michigan and Ontario; also Siberia. NEWFOUNDLAND: dry rocky clearings, Grand Falls, July 10, 1911, *Fernald, Wiegand, Bartram & Darlington*, no. 4366. QUEBEC: dry woods, Grindstone, Grindstone Island, Magdalen Islands, July 22, 1912, *Fernald, Bartram, Long & St. John*, no. 6696. PRINCE EDWARD ISLAND: dry open woods, Rocky Point, July 6, 1912, *Fernald & St. John*, no. 6695. NOVA SCOTIA: damp woods, North Sydney, July 21–25, 1901, *Howe & Lang*, no. 692. MAINE: woods, Fall Brook, north of St. Francis, July 21, 1908, *Churchill;* damp woods, Fort Kent, July 12, 1903, *Pease*, no. 2588; dry woods, Van Buren, July 24, 1893, *Fernald*, no. 213a; dry woods, Orono, October 13, 1890, *Fernald;* dry woods, Dover, September 4, 1894, *Fernald*, July 22, 1895, *Fernald* (TYPE in herb. New England Botanical Club). NEW HAMPSHIRE: White Mountains, 1842, *A. Gray*, July 28, 1853, *Wm. Boott;* ledge, Randolph, July 24, 1893, *E. F. Williams;* Shelburne, September, 1893, *Farlow;* summit of Starr King, September 15, 1897, *W. Deane;* woods, Colebrook, July 15, 1907, *Pease*, no. 10,443; foot of Moat Mt., North Conway, August 26, 1878, *W. C. Lane;* rich woods, Jaffrey, July 9, 1897, *Robinson*, no. 189; cold wet woods, Contoocook, October 11, 1899, *F. G. Floyd.* VERMONT: Jay Peak, July 7, 1908, *E. J. Winslow.* MASSACHUSETTS: Chebacco woods, Essex, September 19, 1896, *Raynal Dodge;* low woods, Cold Brook Springs, Oakham May 12, 1912, *Fernald & Wiegand;* woods, Ashfield, August 2, 1909, *E. F. Williams*, woods, Buckland, August 23, 1906, *F. F. Forbes.* CONNECTICUT: pine woods, Winchester, June 25, 1901, *C. H. Bissell.* PENNSYLVANIA: Moraine, Pocono Plateau, July 25, 1904, *J. W. Harshberger.* MICHIGAN: Hamlin Lake, Ludington, July 28, 1910, *R. W. Chaney*, no. 21; woods near Lake Michigan, August 17, 1901, *M. A. Barber.* ONTARIO: Onaman River, Thunder Bay District, 1912, *H. E. Pulling.* SIBERIA: River Pjosscha, Samojed, *Schrenk.*

Var. PUNGENS (La Pylaie) Desv. Mém. Soc. Linn. Paris, vi. 182

(1827); Spring, Mon. Lycop i. 78 (1841). *L. pungens* La Pylaie acc. to Desv. l. c.—Exposed rocky or peaty habitats, Greenland, Labrador and Newfoundland to the mountains of northern New England, the eastern coast of Maine, and northern Minnesota; also eastern Asia; and in the Tyrol (according to Luerssen).[1]

Var. ALPESTRE Hartm. Skand. Fl. ed. 2, 294 (1832).—Northern Europe and northwestern North America. BRITISH COLUMBIA: Mt. Arrowsmith, Vancouver Island, July 17, 1887, *J. Macoun*, no. 11,519. ALASKA: top of high hill, Ilinlink, Unalaska, October 1, 1871, *M. W. Harrington.*

Vars. *alpestre* and *pungens* seem to be the alpine and boreal extremes of the two woodland plants of more temperate habitats, true *L. annotinum* and var. *acrifolium*. It is specially noteworthy, therefore, that the flat- and broad-leaved var. *alpestre* of northern Europe should have been found in North America only at the northwestern edge of the continent, although in the East the flat- and broad-leaved typical woodland *L. annotinum* abounds. It is also noteworthy that the two plants with firm rigid entire and acerose-attenuate leaves, vars. *acrifolium* and *pungens*, widely distributed in northeastern America, should be unknown from western North America and rare or unknown in Europe, but both present in northern Asia. The ranges of these varieties thus fall essentially into the definite groupings — Europe and western America, eastern America and Asia — already familiar in hundreds of other cases.

GRAY HERBARIUM.

ANTENNARIA CANADENSIS IN PENNSYLVANIA.

HAROLD W. PRETZ.

IN his article, entitled "Southerly Range Extensions in Antennaria,"[2] Mr. Bayard Long makes the following statement: "Although *Antennaria canadensis* has not yet, to the best of my knowledge, been collected between the Catskills and Natural Bridge, I feel that

[1] Luerssen does not recognize var. *alpestre*, and it is probable that the plant of the Tyrol referred by him to the American var. *pungens* may prove to be the European var. *alpestre*.

[2] RHODORA XV. 121 (1913).

with future work in the Alleghanies its occurrence in Pennsylvania will be established."

With some material sent to the Academy of Natural Sciences in Philadelphia in the autumn of 1913 was an *Antennaria* collected on May 4th. of that year along the road near the Behrens Farm situated on the plateau about 3½ miles northeast of East Mauch Chunk, Pennsylvania. Mr. Bayard Long referred the plant, though immature, to *A. canadensis* Greene, a determination that was later confirmed by Prof. M. L. Fernald, who fortunately happened to visit the Academy at this time.

This collection, though quite satisfactory as far as record was concerned, nevertheless made it highly desirable that more mature material be collected as well as that some data be secured relative to the local distribution of the plant. It was accordingly arranged that the following spring a joint trip by Mr. Long and the writer be made to the region of this collection. On May 16, 1914, Mr. Long visited the writer and on the morning of the 17th., in company with Messrs. E. S. and W. I. Mattern, the writer's companions in field work, a start was made for this region which lies about thirty miles distant to the northwest of Allentown, Pennsylvania.

This plateau or mountain region is known as the Pohopoco Mountains, but it is really a part, or extension to the west and southwest, of the well known Pocono Plateau. The continuation of the plateau still further west across the "Gorge" of the Lehigh river is known as Broad Mountain. Botanically the entire plateau region offers a most interesting field, but it would be quite outside the scope of this note to make any further reference to it except to note that the immediate region of this collection is south of the Terminal Moraine and that the Canadian is not so strong an element in this association as in that of the typical Pocono region, which is so rich in species of general Canadian association.

East Mauch Chunk lies along the Lehigh river practically against an escarpment of this general plateau region. It is built on a hill well above the level of the river. At the highest point in the town there are several open fields, and as Antennarias were the chief object of this excursion into the region a stop was made here. It took but a few minutes to discover *A. canadensis* in fair frequency in this field. It grew in isolated patches, or mats, and quite agreed in form and habit with the plant as Mr. Long knew it in its northern range.

Associated with it in the same field were *A. fallax* Greene, *A. neodioica* Greene, *A. neglecta* Greene and *A. Parlinii* Fernald. The elevation of this field according to Mr. W. B. Tombler, City Engineer of East Mauch Chunk, is 829.5 feet.

From this point a single road leads gradually up the steep escarpment to the plateau. This road crosses the plateau and finally reaches the "Poconos," passing several places where there are farms or clearings. Other roads branch off in different directions. The roadsides and clearings in the vicinity of these farms offer the most favorable habitats for Antennarias, for commonly a rather dense scrub association closely borders the roads.

There were few Antennarias seen on the trip of several miles across the plateau past the clearings but in the vicinity of the Behrens Farm where the original collection was made, two small mats of *A. canadensis* were found less than $\frac{1}{2}$ mile apart. The elevation of the plateau at this point is approximately 1600 feet. Shrubby vegetation was coming into leaf in the valley near East Mauch Chunk, but was less advanced on the plateau, and Mr. Long observed that the Scrub Oak here was advanced in seasonal growth about as far as the same species on the New Jersey coastal plain noted by him a month previous. Though the rest of the day was pleasantly spent in the region no more *A. canadensis* was seen.

Since this trip was made the writer has crossed Broad Mountain but no *A. canadensis* was discovered though it was looked for. At one place only along the "pike" over Broad Mountain, extending from near Mauch Chunk to Hudsondale, *A. neodioica* was seen. This species was seen also along the railroad near Hudsondale. Rain unfortunately prevented the thorough examination of some promising areas near Weatherly, and in crossing them only *A. neodioica* was seen. Other brief excursions have been made into the higher mountains further north by northwest, but no *A. canadensis* has been discovered. Possibly, as Mr. Long suggests, the lower, rather than the higher, slopes of the Alleghanies may prove to be the more favorable habitats.

In the writer's own county of Lehigh, Pennsylvania, Antennarias are frequent to abundant. Although plants referred to *A. petaloidea* and *A. occidentalis,* both of northern distribution, have been collected, no *A. canadensis* has been discovered although it has been diligently looked for. The occurrence of *A. petaloidea* is based upon a single collection in the upper Perkiomen Valley in the vicinity of the South

Mountains. The identification of this species has been confirmed by Prof. Fernald. *A. occidentalis* has been collected twice but in one case the material is not thoroughly characteristic and in the other it consists of difficultly identifiable staminate plants. The county is rather definitely Alleghanian in its plant life, as has been shown through an intensive study of the flora for a number of years, and the occurrence of *A. canadensis*, which Mr. Long in his article has shown to be of Canadian association, is hardly to be expected here unless it be found to occur as an isolated extension, as is apparently the case in the county with the above mentioned species.

The Mauch Chunk region, however, contains a much more definite Canadian element in its plant associations. *A. canadensis* occurs there in at least three stations while careful search has not revealed its presence in Lehigh county. *A. Parlinii*, though, has been collected only at a single station near Mauch Chunk, and none has been noted in the mountain country explored to the northward, but its wide distribution in Lehigh county is known by a series of collections from the vicinity of the Kittatinny mountains in the extreme north to the upper Perkiomen Valley in the extreme southern portion. All this is rather suggestive of the correctness of Mr. Long's understanding of the life associations of these plants.

ALLENTOWN, PENNSYLVANIA.

The JOSSELYN BOTANICAL SOCIETY OF MAINE will meet at Waterville, August 10, 1915. Headquarters at the Elmwood House. Further notice, with program, will be sent to members and to any persons interested two weeks previous to the meeting.— DANA W. FELLOWS, Secretary, Portland, Maine.

Vol. 17, no. 197, including pages 89 to 104, was issued 11 May, 1915.

A HELPFUL NEW BOOK

Coulter's Botanical Notebook and Laboratory Manual

PRICE, 36 CENTS. WITH LOOSE LEAF BINDER, 72 CENTS.

By John Gaylord Coulter, Ph.D., Critic Teacher of Biology, University High School, Normal, Ill.

A VALUABLE adjunct to the author's textbook, Plant Life and Plant Uses, from which reading assignments are made in connection with the exercises. Each of the seventy-two exercises contains at least one "thought question," and the directions and questions are clear and definite. The outlines are designed for courses which begin in the winter and continue for the remainder of the year.

The materials named are available in a typical region, yet it is expected that such modifications will be made as will fit the course still better for any particular locality. With this in view the materials are suggested by families rather than by particular forms.

The aim is to develop thought as well as to provide for organization and expression and to give as much opportunity for the pupil's individuality as is consistent with definite results and with the teacher's working hours. Properly employed as a record of the pupil's real self, this notebook will be to the teacher a reliable guide as to how best to direct his further development.

AMERICAN BOOK COMPANY

New York Cincinnati Chicago Boston

HOME GROWN LILIES.

Fresh from Beds. Wild Flowers, Hardy plants of all kinds.

Send for catalogue

F. H. Horsford, Charlotte, Vt.

A YOSEMITE FLORA by Harvey Monroe Hall and Carlotta Case Hall. A descriptive guide, with keys. Includes most species of the Sierra Nevada Mountains. 282 pages, 11 plates, and 170 text-figures. Pocket-size. Attractively bound in flexible leather. Postpaid, $2.00 net.

PAUL ELDER & CO.

239 GRANT AVENUE, SAN FRANCISCO, CAL.

ICELAND Horseback Tours in Saga-Land,—*Russell.* Of value to Botanists,—to all Scientists. "Best book on Iceland in 100 years,"—*Icelandic Review.* 12 Mo. Cl. Ornamental; Ill. Photos by author; 314 pp. Mailed in U. S. on receipt of *Net Price*, . . . $2.00.

CAMBRIDGE BOTANICAL SUPPLY COMPANY

Laboratory, ... WAVERLEY, MASS., ... *Equipment.*